Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Optimization of plasma current profile by lower hybrid current drive on EAST for steady-state operation with high internal inductance[1]

NONG XIANG, JIALE CHEN, WENFENG GUO, JINGPING QIAN, XUEMEI ZHAI, YUEHENG HUANG, ZEHUA QIAN, LONGHAO MA, XIANZU GONG, HAIQING LIU, BO LYU, QING ZANG, YUMIN WANG, Institute of Plasma Physics, Chinese Academy of Sciences, EAST TEAM — A H-mode discharge with a relatively high value of the internal inductance l_i that may improve confinement and raise the stability limit to high β_N has attracted considerable attentions in recent years[1], and it is proposed as one of promising scenarios to achieve steady-state (SS) operations with RF heating only on EAST. To assess how l_i varies with plasma parameters, predictive modeling and experiments are conducted for different operation parameters. It is shown by phase space analysis and GENRAY/CQL3D simulations that the variation of the parallel wave refractive index $N_{//}$ which determines the power deposition profile of lower hybrid (LH) waves, depends mainly on the wave frequency, q profile, and density profile, and so does the current profile[2]. The modeling indicates that a discharge with a lower density and plasma current is favorable to obtain a higher l_i. A series of experiments are carried out in which only LH current drive and electron cyclotron heating are applied to sustain the SS H-mode discharges. The experimental results confirm that l_i decreases with the plasma density and current. The performance of plasma will be evaluated with more experiments and integrated modeling simulations over a broader parametric regime. [1] Ferron, et al., 2015 Nucl. Fusion 55, 073030. [2] Zhai, et al., 2019, Plasma Phys. Control. Fusion 61, 045002.

[1]National Key RD Program of China under Grant No. 2017YFE0300400

Nong Xiang
Institute of Plasma Physics, Chinese Academy of Sciences

Date submitted: 01 Jul 2019 Electronic form version 1.4